

- 22 -

CLAIMS

1. An optical connector arrangement comprising:
 - a connector component embedded in a substrate material, said embedded connector component including a fibre optic grating optically coupled
 - 5 to a reflector for directing radiation emitted from said fibre optic grating to a surface of said substrate material; and
 - a surface connector component for collecting radiation emitted from the surface of said substrate material.
2. The optical connector arrangement of Claim 1, wherein the substrate
- 10 material is a composite material.
3. The optical connector arrangement of Claim 1 or Claim 2, wherein the substrate comprises a plurality of material layers.
4. The optical connector arrangement of any preceding Claim, wherein an optical fibre comprising the grating is bonded to the reflector using an index
- 15 matching material.
5. The optical connector arrangement of any preceding Claim, wherein the embedded connector component is potted into a recess in the substrate using an optically transparent material.
6. The optical connector arrangement of Claim 5, wherein the optically
- 20 transparent material is formed flush with the surface of said substrate material.
7. The optical connector arrangement of any preceding Claim, wherein the reflector has a curved reflecting surface.
8. The optical connector arrangement of Claim 7, wherein the curved reflecting surface is part of a cylindrical surface.
- 25 9. The optical connector arrangement of Claim 7, wherein the curved reflecting surface has a substantially constant part elliptically shaped or parabolically shaped cross-section along its length.
10. The optical connector arrangement of Claim 9, wherein an axis of the fibre optic grating lies proximal to a focal point of said part elliptically shaped or

- 23 -

parabolically shaped cross-section along at least part of the length of said curved reflecting surface.

11. The optical connector arrangement of any preceding Claim, wherein the surface connector component comprises a further optical fibre incorporating a grating for optically co-operating with the fibre optic grating provided in said substrate.

12. The optical connector arrangement of any preceding Claim, wherein a grating comprises one or more of: a Bragg grating, a slanted/blazed Bragg grating and a long period grating.

13. The optical connector arrangement of any preceding Claim, wherein radiation emitted from the surface of said substrate material is substantially collimated.

14. An embeddable connector component for embedding in a substrate material and/or for use in a surface connector component, said embeddable connector component including a fibre optic grating optically coupled to a reflector for directing radiation emitted from said fibre optic grating to a surface of a substrate material.

15. The embeddable connector component of Claim 14, wherein an optical fibre comprising the grating is bonded to the reflector using an index matching material.

16. The embeddable connector component of Claim 14 or Claim 15, wherein the reflector has a curved reflecting surface.

17. The embeddable connector component of Claim 16, wherein the curved reflecting surface is part of a cylindrical surface.

18. The embeddable connector component of Claim 16, wherein the curved reflecting surface has a substantially constant part elliptically shaped or parabolically shaped cross-section along its length.

19. The embeddable connector component of Claim 18, wherein an axis of the fibre optic grating lies proximal to a focal point of said part elliptically shaped

- 24 -

or parabolically shaped cross-section along at least part of the length of said curved reflecting surface.

20. The embeddable connector component of any one of Claims 14 to 19, wherein said grating comprises: a Bragg grating, a slanted/blazed Bragg grating
5 or a long period grating.

21. The embeddable connector component of any one of Claims 14 to 20, wherein radiation reflected by said reflector is substantially collimated.

22. A panel for a vehicle fuselage, component, body or hull, comprising the embeddable connector component according to any one of Claims 14 to 21.

10 23. An vehicle comprising a composite panel according to Claim 22.

24. A method of manufacturing a vehicle, comprising incorporating a composite panel according to Claim 22 into a vehicle fuselage, component, body or hull.

15 25. A surface connector component for use in the optical connector arrangement according to any one of Claims 1 to 13.

26. A method of manufacturing an optical connector arrangement comprising:

20 embedding a connector component in a substrate material, said embedded connector component including a fibre optic grating optically coupled to a reflector for directing radiation emitted from said fibre optic grating to a surface of said substrate material; and

providing a surface connector component for collecting radiation emitted from the surface of said substrate material.

25 27. The method of Claim 26, wherein the step of embedding the connector component in a substrate material comprises providing a plurality of composite material layers to form a composite material.

28. The method of Claim 27, wherein each composite material layer comprises respectively aligned material fibres.

- 25 -

29. The method of Claim 28, further comprising selecting the material fibres from one or more of the following materials: carbon, glass, metal and Kevlar.
30. The method of any one of Claims 26 to 29, comprising potting the connector component into a recess in the substrate material using an optically transparent material.
31. The method of Claim 30, comprising forming the optically transparent material flush with the surface of said substrate material.
32. The method of any one of Claims 26 to 31, comprising providing the surface connector component with a further optical fibre incorporating a grating.
33. The method of any one of Claims 26 to 32, comprising selecting a grating from one or more of: a Bragg grating, a slanted/blazed Bragg grating and a long period grating.
34. The method of any one of Claims 26 to 33, comprising forming the reflector from a cylindrical tube.
35. A method of manufacturing an embeddable connector component for use in an optical connector manufactured according to the method of any one of Claims 26 to 34, comprising bonding an optical fibre comprising the grating to a reflector using an index matching material.
36. An optical connector arrangement substantially as hereinbefore described with reference to Figures 5 and 9 of the accompanying drawings.
37. An embeddable connector component substantially as hereinbefore described with reference to Figures 2 and 6 to 10 of the accompanying drawings.
38. A surface connector component substantially as hereinbefore described with reference to Figures 5, 8, 9 and 11 of the accompanying drawings.
39. A method of manufacturing an optical connector arrangement substantially as hereinbefore described with reference to the accompanying drawings.

- 26 -

40. A method of manufacturing an embeddable connector component substantially as hereinbefore described with reference to the accompanying drawings.